

Assessing the value of genetic linear profiles for selecting for sport performance of riding horses

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Routine linear profiling and estimation of breeding values (EBV) for linear traits allow refined characterization of the individual horse and its genetics with regard to conformation, gaits and jumping. When compared to genetic proofs for performance in sport competitions, genetic linear profiles become available earlier, but the value of individual linear traits as indicators for favorable performance in riding sport is unclear. The aim of this study was to determine association patterns between the set of 46 linear traits included in the routine genetic evaluation of the Oldenburg studbooks, OL and OS, and sport traits, using rank-based (R) and summarizing (highest level achieved, L) trait definitions for reflecting dressage (D) and show jumping (J) competition performance. Statistical analyses were performed with SAS software on the basis of EBV of the active mare population of OL and OS comprising together almost 7,200 mares. Correlation analyses and analyses of variance included between 604 and 629 mares which fulfilled the inclusion criteria of own phenotypic data and/or at least two progeny with phenotypic data for indicator and target traits (DR, DL, JR, JL) in the respective genetic evaluations. Associations patterns with the sport traits were derived considering the linear traits either directly (Pearson correlations, linear regression) or as class variables. Results indicated absent or low correlations of $|r^2| < 0.2$ with EBV for sport performance for EBV for most of the 24 linear conformation traits (D N=16, J N=23). Conversely, significant correlations with $P < 0.001$ were found for 11 of the 12 linear gait traits with regard to D and for 8 of the 10 linear jumping traits regarding to J. Analyses of variance revealed consistent results, indicating slightly different patterns for trait definitions L and R and high indicator value ($r^2 > 0.5$) of reach of hind limbs in walk, carrying power and reach of front limbs in trot and direction of movement in canter for D and jumping ability for J. Our results support the use of genetic linear profiles in breeding programs of riding horses.